PARTITIONED MEDIUM ACCESS CONTROL IMPLEMENTATION

REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of:

(i) U.S. patent application Ser. No. 10/421,265, filed on 23 Apr. 2003, entitled "Partitioned Medium Access Control," now pending, which itself claims priority based on:

(ii) U.S. provisional patent application Ser. No. 60/377,679, filed 3 May 2002, entitled "Exposable Intra-MAC for Wireless LANs," now expired.

Both of these applications are incorporated by reference.

FIELD OF THE INVENTION

The present invention relates to telecommunications in general, and, more particularly, to a novel medium access control architecture.

BACKGROUND OF THE INVENTION

FIG. **1** depicts a schematic diagram of a wireless local area network in the prior art, which comprises: terminal **101-1**, terminal **101-2**, and terminal **101-3**. Before terminals **101-1**, **101-2**, and **101-3** can communicate with each other, there must be an agreement between the terminals as to the meaning of the signals that they transmit. For example, the terminals must agree on who talks when, what constitutes a "0" and a "1," how is an error detected and corrected, etc. In the terminology of telecommunications, this agreement is called a protocol.

The terminals in a local area network share a communications channel such that if two or more of the terminals transmit into the channel simultaneously, a cacophony results and all of the transmissions are corrupted. Therefore, a local area network protocol includes a mechanism for ensuring that only one terminal at a time transmits into the shared-communications channel. This mechanism is known as medium access control. In some implementations, medium access control can provide additional services such as message encryption and authentication, as well as quality of service (QoS) provisioning and power conservation.

FIG. **2** depicts a schematic diagram of wireless terminal **101-*i***, wherein i is a member of the set {1, 2, 3}, in the prior art. As shown in FIG. **2**, wireless terminal **101-*i*** comprises: a host computing device **201** and a wireless station **202**, interconnected as shown. Host computing device **201** is a notebook computer, personal digital assistant (PDA), etc. Host computing device **201** sends data to wireless station **202** for transmission to other wireless terminals, and similarly, wireless station **202** receives data from other wireless terminals and sends these data to host computing device **201**. Wireless station **202** thus enables host computing device **201** to communicate in wireless fashion with other terminals.

FIG. **3** depicts a conceptual architectural diagram of wireless station **202** in accordance with the prior art. As shown in FIG. **3**, wireless station **202** comprises: processor **303**, memory **304**, higher-layers module **305**, logical link control (LLC) **310**, medium access control (MAC) **320**, physical control **330**, transmitter **340**, and receiver **350**, interconnected as shown.

Processor **303** is a general-purpose processor that is capable of executing instructions stored in memory **304**, and of reading data from and writing data into memory **304**. Memory **304** is capable of storing programs and data used by processor **303**, as is well known in the art, and might be any combination of random-access memory (RAM), flash memory, disk drive, etc. Higher-layers module **305** is capable of executing the tasks associated with the transport, session, presentation, and application layers of the open systems interconnect (OSI) reference model, as is well known in the art.

Logical link control (LLC) **310** performs a variety of tasks, including (i) multiplexing data packets; (ii) sending multiplexed data packets to medium access control **320** via output **311**; (iii) receiving packets from medium access control **320** via link **311**; (iv) demultiplexing the packets received via input **312**; (v) establishing and maintaining logical point-to-point connections over the shared-communications channel; and (vi) provisioning acknowledgements for individual messages on behalf of those network protocols that require such connection-oriented or acknowledged connectionless services, as is well known in the art.

Medium access control **320** performs the channel access function, which ensures that only one terminal at a time can transmit signals onto the shared-communications channel, as well as frame addressing and detection, generating and checking frame check sequences, and delimiting logical link control protocol data units, as is well known in the art. In addition, medium access control may provide additional services including encryption, authentication, and quality-of-service (QoS) provisioning, as well as related, non-communication functions such as power management, as is well known in the art.

Physical control (PHY) **330** administers the physical transmission of signals to other terminals and the physical receipt of signals from other terminals via the network medium (e.g., radio, Ethernet, etc.), as is well known in the art. As shown in FIG. **3**, physical control **330** (i) receives data from medium access control **320** via input/output **321**; (ii) sends data to transmitter **340** for wireless transmission to other terminals; (iii) receives data from other terminals via receiver **350**; and (iv) passes data to medium access control **320** via input/output **321**.

Transmitter **340** is a hybrid analog and digital circuit that is capable of receiving data from physical control **330** and of transmitting data wirelessly into a shared-communications channel. Receiver **350** is a hybrid analog and digital circuit that is capable of receiving data wirelessly via a shared-communications channel and relaying data to physical control **330**.

As described above, medium access control **320** is theoretically decoupled from the mechanism for controlling the physical (i.e., radio) transmission and receipt of message signals (referred to throughout this specification as the "physical control"). In practice, however, in some wireless local area networks, such as those that conform to the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standard, the medium access control and the physical control are inextricably intertwined.

In order to mitigate the interdependence between medium access control **320** and physical control **330**, U.S. patent application Ser. No. 10/421,265, entitled "Partitioned Medium Access Control," discloses a medium access control that is bifurcated into (i) an upper medium access control that provides those medium-access-control services that are independent of the physical control, and (ii) a lower medium access control that provides those medium-access-control services that are dependent on the physical control. This is especially advantageous for IEEE 802.11 wireless networks because it enables the standardization, development, and implementation of some of the medium-access-control services to be decoupled from the standardization, development, and implementation of the physical control, while maintain-